Relapsing Fever

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To educate potentially exposed persons about signs and symptoms of disease to facilitate early diagnosis and treatment.
2. To inform owners of potentially tick-infested property (e.g., a vacation cabin) how to reduce their risk of exposure.
3. To identify endemic geographic areas within Washington state.

B. Legal Reporting Requirements

1. Health care providers: **immediately notifiable to local health jurisdiction.**
2. Hospitals: **immediately notifiable to local health jurisdiction**.
3. Laboratories: no requirements for notification.
4. Local health jurisdictions: notifiable to Washington State Department of Health (DOH) Communicable Disease Epidemiology Section (CDES) within 7 days of case investigation completion or summary information required within 21 days.

C. Local Health Jurisdiction Investigation Responsibilities

1. Begin follow-up investigation within one working day.
2. Educate other persons exposed about the signs and symptoms of disease.
3. Provide education to eliminate the source of infection.
4. Report all *confirmed* and *probable* cases (see definitions below) to CDES. Complete the relapsing fever case report form (http://www.doh.wa.gov/notify/forms/relaps.doc) and enter the data into the Public Health Issues Management System (PHIMS).

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Tick-borne relapsing fever is most commonly caused by *Borrelia hermsii*, but can be caused by at least 14 other *Borrelia* species. In louse-borne disease, *B. recurrentis* is the only etiologic agent.

B. Description of Illness

Relapsing fever is a systemic spirochetal disease in which periods of fever lasting 2–7 days alternate with afebrile periods of 4–14 days; the number of relapses varies from 1 to 10 without treatment. Febrile periods are often associated with shaking chills, sweats, headache, muscle and joint pain, and can be associated with a rash. Each febrile period terminates by crisis (abrupt symptom change).

Recent findings indicate that acute respiratory distress syndrome (ARDS) might occur more frequently in patients with tick-borne relapsing fever than previously recognized.*

Optimal management of tick-borne relapsing fever requires both prompt diagnosis and careful observation during the initial phases of treatment. With treatment the mortality rate is very low. The mortality rate without treatment is estimated at 5–10%. Tick-borne relapsing fever contacted during pregnancy can cause spontaneous abortion, premature birth, and neonatal death.

*Centers for Disease Control and Prevention. Acute Respiratory Distress Syndrome in Persons with Tickborne Relapsing Fever --- Three States, 2004–2005. MMWR 2007;56:1073–76. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5641a1.htm.

C. Relapsing Fever in Washington

Tick-borne relapsing fever is among the most common tick-borne illnesses contracted in Washington State. One to 12 cases are reported annually. Exposures are almost always associated with overnight stays in rural cabins. The louse-borne form of this disease is not endemic to the United States and it would be rare even in travelers returning to Washington State.

D. Vectors and Reservoirs

In tick-borne relapsing fever, the vector is a soft tick. In the United States, the soft ticks *Ornithodoros hermsii* and *O. turicata* most commonly transmit the infection. The most common reservoirs in Washington appear to be wild rodents and soft ticks. Soft ticks become infected by feeding on wild rodents and then remain infective for their lifespan, passing the infection to their progeny.

The body louse (*Pediculus humanus*) is the vector for louse-borne relapsing fever. Lice become infected after feeding on infected humans.

E. Modes of Transmission

In tick-borne disease, people are infected by bites of soft ticks. The bites are usually unnoticed since they generally are not painful and occur at night. In addition, the ticks feed quickly (5–20 minutes) then leave the host. In western states including Washington, ticks may be present in rustic cabins and woodpiles with rodent infestation. Tick-borne relapsing fever is not directly transmitted from person to person, but theoretically might be transmitted by blood transfusion.

Louse-borne disease is not endemic to the United States but may occur in travelers. Louse-borne relapsing fever is acquired by crushing an infective louse, *Pediculus humanus*, so that it contaminates the bite wound or mucous membranes.

F. Incubation Period

The incubation period is usually about 7 days but can range from 2 to 18 days.

G. Period of Communicability

Tick-borne relapsing fever is not directly transmitted from person to person. Infected ticks can live for several years without feeding; they remain infective during this period and pass the infection to their progeny. Tick-infested cabins may be difficult to decontaminate.

H. Treatment

Relapsing fever is treated with appropriate antibiotic therapy. Antibiotic treatment can cause a Jarisch-Herxheimer reaction (i.e., severe chills, increased temperature, decreased blood pressure), so patients should be monitored closely, particularly during the first 4 hours after antibiotics are administered.

3. CASE DEFINITIONS

A. Clinical Criteria for Diagnosis

A febrile illness with temperature ≥100.5°F (38.0°C). A typical clinical presentation occurs following exposure in a rural setting and is characterized by a relapsing pattern of fever, chills, headache, and myalgias.

B. Laboratory Criteria for Diagnosis

1. Identification of spirochetes by dark field microscopy, or Giemsa-, Wright-, or acridine orange-preparations of peripheral blood, bone marrow, or cerebral spinal fluid (CSF).
2. Isolation of *Borrelia* species from blood using special media.

C. Case Definition

1. Probable: A case with the typical clinical presentation that is not laboratory confirmed and is not epidemiologically linked to a confirmed case.
2. Confirmed: A case that is laboratory confirmed, or that meets the clinical case definition and is epidemiologically linked to a confirmed case.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Diagnosis

Diagnosis of tick-borne relapsing fever is most commonly made by identification of spirochetes on a peripheral blood smear of a febrile patient (either by dark field microscopy or microscopic examination of a stained thick or thin blood film). Diagnosis is less commonly made by blood culture in special media.

Although not valuable for making an immediate diagnosis, serologic testing is available through the CDC. Patients with tick-borne relapsing fever may have false-positive tests for Lyme disease because of the similarity between the two

organisms. More information regarding serologic testing can be found at: http://www.cdc.gov/ncidod/dvbid/RelapsingFever/RF_LabAnalysis.htm.

B. Services Available at the Washington State Public Health Laboratory (PHL)

PHL will examine peripheral blood smears for spirochetes and will forward specimens to the CDC if additional tests are needed. Serologic testing is available through the CDC but is not case defining. All requests sent to PHL must have the approval from the local health jurisdiction, who will get approval from CDES.

C. Specimen collection

1. **Blood smear:** any hospital or commercial laboratory can advise.
2. **Serum**
   - Acute serum should be taken within 7 days of symptom onset and convalescent serum should be taken at least 21 days after symptoms start.
   - Specimens should be refrigerated and transported cold. Avoid repeated freeze-thaw cycles.
   - Specimens should be submitted to PHL with a completed PHL serology form (http://www.doh.wa.gov/EHSPHL/PHL/Forms/Serology.pdf).

5. ROUTINE CASE INVESTIGATION

Interview the case and others who might provide pertinent information.

A. Evaluate the Diagnosis

Using the case reform form, collect clinical information (e.g., onset, signs and symptoms) about the patient. Review laboratory tests performed.

B. Identify Potential Sources of Infection

Ask whether the patient slept outside, in a cabin, or in other places with evidence of rodents in the 18 days prior to onset. Ask about tick or insect bites.

C. Identify Potentially Exposed Persons

Identify persons who shared the exposure with the case (i.e., slept in the same cabin) and educate them about symptoms and treatment of relapsing fever. Determine whether any women who shared the exposure with the case are pregnant.

Determine if the patient donated blood, tissues or organs during the recent past. If so, contact CDES immediately and inform the blood or tissue bank of the potential exposure.

D. Environmental Evaluation

Notify local environmental health program and/or vector control of locally acquired cases. If the case was exposed on public property or in a building used

by the general public, evaluate the site for evidence of rodent infestation. Work with the agency that oversees the site and make recommendations to decrease rodent and tick infestation on the site (see "Environmental Measures" below).

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations

1. Persons hospitalized for tick-borne relapsing fever should be cared for using standard precautions.
2. Persons with louse-borne relapsing fever should also be cared for using standard precautions, but staff should wear a gown and gloves when removing initial clothing of the patient to prevent louse transmission. Clothing should be bagged.
3. Cases do not need to be restricted from work or child care.

B. Case Management: No long-term follow-up is indicated for public health purposes

C. Contact Management

Tick-borne relapsing fever is not spread from person to person so close contacts exposed to the case are not at risk for infection. Contact CDES to discuss management of close contacts of persons with louse-borne relapsing fever.

D. Management of Other Exposed Persons

Educate all persons who shared the exposure with the case about symptoms of relapsing fever to facilitate early diagnosis. Refer potentially exposed pregnant women to their doctor immediately to discuss prophylactic antibiotics.

E. Environmental Measures

If the site of exposure is determined to be a tick and rodent infested human habitation, provide the following information to the owner of the private property or the agency overseeing the public property:

- Educate the owner about the ecology of tick-borne relapsing fever (see above).
- Recommend the removal of woodpiles from under/around the cabin to prevent rodent infestation outside the cabin.
- Recommend sealing the home (including roof, walls, doors, windows, around pipes, etc.) to prevent rodents from entering.
- Recommend placing all food in secondary containers to keep rodents from entering the cabin in search of food.
- Recommend the owner hire a professional pest control company to provide soft tick control.

- Warn the owner that rodent proofing without implementing tick control might increase the risk for tick-borne relapsing fever since the ticks can be left in the property after the rodents are removed.

7. MANAGING SPECIAL SITUATIONS

Determine if the case is associated with or potentially associated with an outbreak.

If an outbreak is suspected, notify CDES immediately: 1-877-539-4344.

8. ROUTINE PREVENTION

A. Immunization Recommendations: None

B. Prevention Recommendations for Tick-borne Relapsing Fever

1. Persons should avoid sleeping in rodent infested buildings.
2. Persons should rodent-proof structures to prevent future colonization by rodents and their soft ticks.
   - **Inspect** structures on a regular basis for signs of rodent activity.
   - **Eliminate** rodent nesting areas from your structure.
   - **Use** food and waste-handling practices that eliminate food sources for rodents.
   - **Rodent-proof** your cabin as follows:
     - Seal all holes in foundation and walls.
     - Place heavy gauge metal screens on windows, vents, and other openings to prevent entry of rodents.
   - Place an 18" perimeter border of gravel around the cabin. This can help prevent the movement of rodents and ticks into the cabin.

ACKNOWLEDGEMENTS

This document is a revision of the Washington State Guidelines for Notifiable Condition Reporting and Surveillance published in 2002 which were originally based on the Control of Communicable Diseases Manual (CCDM), 17th Edition; James Chin, Ed. APHA 2000. We would like to acknowledge the Oregon Department of Human Services for developing the format of this document.